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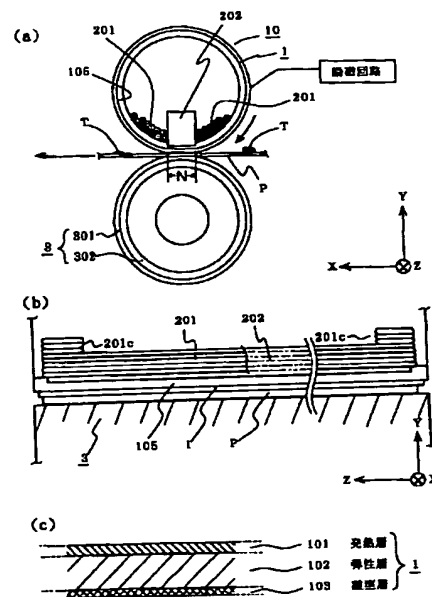
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(54) 【発明の名称】 加熱装置及び画像形成装置

(57) 【要約】

【課題】 加熱装置において加熱部の被加熱材幅方向で均一な温度分布を保つこと。また、該加熱装置を備えた画像形成装置においても定着不良や光沢むらやオフセットの無い高いパフォーマンスを達成すること。

【解決手段】 固定もしくは移動する加熱部材と、交番磁界を発生させ該磁界の作用により該加熱部材を発熱させる磁界発生手段と、該加熱部材に圧接させてニップを形成する加圧部材と、を有し、該ニップに被加熱材を搬送し通過させて該加熱材を加熱する加熱装置であり、被加熱材搬送方向と直交する方向を被加熱材幅方向としたとき、前記磁界発生手段により発生させる磁束の密度を加熱部材の被加熱材幅方向において変えて、ニップの被加熱材幅方向の温度分布を均一にしたこと。



## 【特許請求の範囲】

【請求項1】 固定もしくは移動する加熱部材と、交番磁界を発生させ該磁界の作用により該加熱部材を発熱させる磁界発生手段と、該加熱部材に圧接させてニップを形成する加圧部材と、を有し、該ニップに被加熱材を搬送し通過させて該加熱材を加熱する加熱装置であり、被加熱材搬送方向と直交する方向を被加熱材幅方向としたとき、前記磁界発生手段により発生させる磁束の密度を加熱部材の被加熱材幅方向において変えて、ニップの被加熱材幅方向の温度分布を均一にしたことを特徴とする加熱装置。

【請求項2】 固定もしくは移動する加熱部材と、交番磁界を発生させ該磁界の作用により該加熱部材を発熱させる磁界発生手段と、該加熱部材に圧接させてニップを形成する加圧部材と、を有し、該ニップに被加熱材を搬送し通過させて該加熱材を加熱する加熱装置であり、被加熱材搬送方向と直交する方向を被加熱材幅方向としたとき、前記磁界発生手段は被加熱材幅方向の加熱部材中央部よりも加熱部材端部における磁束密度を高くしたことを特徴とする加熱装置。

【請求項3】 前記磁界発生手段は磁界を発生させる励磁コイルの被加熱材幅方向において中央部よりも端部の巻数を多くしたことを特徴とする請求項1又は2の加熱装置。

【請求項4】 前記磁界発生手段は磁界を発生させる励磁コイルの被加熱材幅方向において端部近傍に補正用コアを配設し磁束を集中させたことを特徴とする請求項1乃至請求項3の何れかに記載の加熱装置。

【請求項5】 記録材上に担持させた顕画剤画像を加熱処理することを特徴とする請求項1乃至請求項4の何れかに記載の加熱装置。

【請求項6】 記録材上に顕画剤画像を担持させる像形成手段と、該顕画剤画像を加熱処理する像加熱装置としての請求項1乃至請求項4の何れかに記載の加熱装置と、を備えたことを特徴とする画像形成装置。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、電磁誘導を利用し加熱部に渦電流損を発生させる等して加熱する加熱装置及びそれを備えた画像形成装置に関する。該加熱装置は、特に電子写真複写機・プリンタ・ファックス等の画像形成装置における定着装置、即ち電子写真・静電記録・磁気記録等の適宜の画像形成プロセス手段により、加熱溶融性の樹脂等よりなるトナーを用いて記録材の面に直接もしくは間接方式で形成した未定着のトナー画像を記録材面に永久固着画像として加熱定着処理する装置に好適なものである。

【0002】

【従来の技術】加熱定着装置に代表される加熱装置としては、従来から熱ローラ方式や、フィルム加熱方式等の

所謂接触加熱方式が広く用いられている。

【0003】その中でも、最大4層のトナー層を十分加熱溶融させる能力を要求されるフルカラーの画像形成を行う画像形成装置の定着装置では、高い熱容量を有する定着ローラの芯金や、トナー像を包み込んで均一に溶融するためのゴム弾性層等を介してトナー像の加熱を行っている。

【0004】このような装置においては、芯金やゴム弾性層等の介在部材を設けている為、良好な定着性を確保すると、熱源と被加熱材とが離れる傾向にあり、高効率化が困難であった。

【0005】一方、特公平5-9027号公報では、磁束により定着ローラに渦電流を発生させジュール熱によって発熱させる電磁加熱方式の加熱装置が開示されており、渦電流の発生を利用することで発熱位置をトナー像に近くすることができ、ハロゲンランプを用いた熱ローラよりも高効率の定着プロセスを達成している。

【0006】

【発明が解決しようとする課題】しかしながら上記電磁加熱方式の加熱装置では、加熱部端部の放熱や、磁束の発生状態が端部と中央部とで異なること等により、被加熱材への加熱が不均一になることがあった。この為、該加熱装置を備えた画像形成装置で定着不良や光沢ムラやオフセット等の問題が発生していた。

【0007】そこで本発明の目的は、加熱装置において加熱部の被加熱材幅方向で均一な温度分布を保つこと。また、該加熱装置を備えた画像形成装置においても定着不良や光沢むらやオフセットの無い高いパフォーマンスを達成することにある。

【0008】

【課題を解決するための手段】本発明は下記の構成を特徴とする加熱装置及び画像形成装置である。

【0009】(1) 固定もしくは移動する加熱部材と、交番磁界を発生させ該磁界の作用により該加熱部材を発熱させる磁界発生手段と、該加熱部材に圧接させてニップを形成する加圧部材と、を有し、該ニップに被加熱材を搬送し通過させて該加熱材を加熱する加熱装置であり、被加熱材搬送方向と直交する方向を被加熱材幅方向としたとき、前記磁界発生手段により発生させる磁束の密度を加熱部材の被加熱材幅方向において変えて、ニップの被加熱材幅方向の温度分布を均一にしたことを特徴とする加熱装置。

【0010】(2) 固定もしくは移動する加熱部材と、交番磁界を発生させ該磁界の作用により該加熱部材を発熱させる磁界発生手段と、該加熱部材に圧接させてニップを形成する加圧部材と、を有し、該ニップに被加熱材を搬送し通過させて該加熱材を加熱する加熱装置であり、被加熱材搬送方向と直交する方向を被加熱材幅方向としたとき、前記磁界発生手段は被加熱材幅方向の加熱部材中央部よりも加熱部材端部における磁束密度を高

くしたことを特徴とする加熱装置。

【0011】(3) 前記磁界発生手段は磁界を発生させる励磁コイルの被加熱材幅方向において中央部よりも端部の巻数を多くしたことを特徴とする(1)又は

(2)の加熱装置。

【0012】(4) 前記磁界発生手段は磁界を発生させる励磁コイルの被加熱材幅方向において端部近傍に補正用コアを配設し磁束を集中させたことを特徴とする

(1)乃至(3)の何れかに記載の加熱装置。

【0013】(5) 記録材上に担持させた顕画剤画像を加熱処理することを特徴とする(1)乃至(4)の何れかに記載の加熱装置。

【0014】(6) 記録材上に顕画剤画像を担持させる像形成手段と、該顕画剤画像を加熱処理する像加熱装置としての(1)乃至(4)の何れかに記載の加熱装置と、を備えたことを特徴とする画像形成装置。

【0015】すなわち、上記コイルの両端部において、巻数を増し、中央部と比べて磁束を多めに発生させることや、上記コイルの両端部近傍に補正用コアを配設し、該端部で磁束を加熱部以外に四散させることなく加熱部に導くこと、等により、磁界発生手段で発生させる磁束の分布を適切に設定して、加熱部材の幅方向の温度分布を均一にすることができる。

【0016】

【発明の実施の形態】

(実施形態例1)

(1)加熱装置の全体構成

図1(a)は本発明の定着装置の概略構成を示す横断面模型図、図1(b)はその縦断面模型図、図1(c)は定着フィルムの模式断面図である。同図において1は定着フィルム、105は磁束の通過を妨げない絶縁性のフィルムガイドで、定着フィルム1はフィルムガイド105によって搬送安定性を図られながら矢印の方向に回転する。201は交番磁束を発生するための励磁コイル、202は励磁コイル201により発生した交番磁束を効率よくニップ周辺で高めるためのフェライトコアであり、フィルムガイド105によって支持されている。

【0017】励磁コイル201には励磁回路が接続されており、この励磁回路は50KHzの交番電流を励磁コイル201へ供給できるようになっている。3は加圧ローラで芯金301上にシリコンゴム層302を2mm被覆させて弾性をもたせ、定着フィルム1を介してフィルムガイド105の下面に圧接してニップNを形成している。また、加圧ローラ3は定着フィルム1を被加熱材としての記録材Pの搬送方向(図中X軸方向)に回転駆動させる駆動ローラの役割も兼ねている。

【0018】而して、上記加熱装置は励磁回路から交番電流をコイル201に供給し、交番磁束を発生させ、該交番磁束がフェライトコア202に導かれて定着フィルム1の発熱層101に渦電流を発生させる。この渦電流

が発熱層101の固有抵抗によってジュール熱を発生させて、弾性層102、離型層103を介してニップNに搬送される記録材Pと記録材P上のトナーTを加熱処理する。

【0019】(2)定着フィルム1

定着フィルム1について説明すると、定着フィルム1は発熱体としてのニッケルからなる厚み50 $\mu$ mの発熱層101の表面をシリコンゴムからなる弾性層102で被覆し、更にフッ素樹脂の離型層103で被覆してある。

【0020】発熱層101としてはニッケル以外にも $10^{-1} \sim 10^{-10} \Omega \cdot m$ の電気良導体である金属、金属化合物、有機導電体を用いてもよく、より好ましくは透磁率が高い(強磁性を示す)鉄、コバルト等の純金属もしくはそれらの化合物を用いることができる。

【0021】該発熱層101の厚みを薄くし過ぎると十分な磁路が確保できなくなり、外部へ磁束が洩れて発熱体自身の発熱エネルギーが小さくなる場合がある。また厚くすると熱容量が大きくなり昇温に要する時間が長くなる傾向がある。従って発熱層101の厚みは発熱体に用いた材料の比熱、密度、透磁率、抵抗率の値によって適正值があり、本実施形態では10~100 $\mu$ mの厚みの範囲で、3 $^{\circ}C/sec$ 以上の昇温速度を得ることができた。

【0022】弾性層102において、硬度が高すぎると記録材あるいはトナー層の凹凸に追従しきれず画像光沢ムラが発生してしまう。そこで、該弾性層102の硬度としては60 $^{\circ}$ (JIS-A)以下、より好ましくは45 $^{\circ}$ (JIS-A)以下がよい。また、弾性層102の熱伝導率 $\lambda$ に関しては $6 \times 10^{-4} \sim 2 \times 10^{-3} [cal/cm \cdot sec \cdot deg.]$ がよい。熱伝導率 $\lambda$ が $6 \times 10^{-4} [cal/cm \cdot sec \cdot deg.]$ よりも小さい場合には、熱抵抗が大きく、定着フィルム1の表層における温度上昇が遅くなる。

【0023】離型層103としてはPFA、PTFE、FEP等のフッ素樹脂以外に、シリコン樹脂、シリコンゴム、フッ素ゴム、等の離型性かつ耐熱性のよい材料を選択することができる。離型層103の厚さは20~100 $\mu$ mが好ましく、該離型層103の厚さが20 $\mu$ mよりも小さいと、製造時に塗膜の塗ムラが生じて離型性の悪い部分ができたり、耐久性が不足するといった問題が発生する。また、離型層が100 $\mu$ mを越えると熱伝導が悪化するという問題が発生し、特に樹脂系の離型層の場合は硬度が高くなりすぎ、弾性層102の効果が薄れてしまう。

【0024】(3)励磁コイル201(図2)

励磁コイル201としては加熱に十分な交番磁束を発生するものでなければならないが、そのためには抵抗成分を低く、インダクタンス成分を高くとる必要がある。本実施形態では励磁コイル201の芯線として細線を束ね

た高周波用のφ1のものをを用いて、図2に示すようにコア202を周回するように12回巻いてある。

【0025】従来図2(a)に示すような単一巻コイル202'であったのに対し、本実施形態例では図3(a)に示す様に1本の電線を連続して巻き、中央部の巻数(12回)よりも両端部の巻数を増している。即ち磁界拘束力の弱い端部の損失を補正するように端部の巻き数を増し、部分的に磁束密度を強くしている。

【0026】このような従来の励磁コイル201'と本例の励磁コイル201とを、他の構成を同じとした加熱装置に備え、長手方向の磁束密度とニップN温度の長手方向(被加熱材幅方向)の分布を比較し、図2(b)、図3(b)に示した。

【0027】従来の励磁コイル201'では図2(b)に示すように磁束密度が長手方向にわたり略一定であり、加熱部材の幅方向端部での磁束光束力が弱いことや、放熱量が多いこと等により、ニップNの温度は両端部で低くなっている。

【0028】これに対し、本例の励磁コイル201では、図3(b)に示すように長手方向端部の磁束密度を中央部と比べて高くしたことにより、ニップNの長手方向全域に渡り均一な温度分布を得ている。このとき図4に示す領域Eにおいて、わずかな逆の磁界が生じるが、ニップNの温度にはほとんど影響なく、無視できる程度である。

【0029】更に図5の様に磁路を確保する為、フェライトコアを補正コイル201cの部分まで延長することでより効果的にすることができる。

【0030】〈実施形態例2〉(図6・図7)

また他の実施形態例として図6の様に励磁コイル201の端部にコア202と同材質のフェライトコア203を配置し、端部から発散する磁束に対し磁路を確保することで磁界の発散を防止し端部の磁束密度を中央部分と同等以上にすることが可能となる。

【0031】また、図7に示す様に補正コイル201cと共に補正用コア203を設けることにより、更に効果的に磁束の分布を設定できる。

【0032】〈実施形態例3〉(図8)

図8の(a)・(b)・(c)はそれぞれ励磁コイル201の他の形態例を示したものである。

【0033】(a)のものは、加熱部材を加熱させる為の主要部201aと該主要部201aに対して逆方向の補正部201bとを有し、主要部201aによる磁束のうち中央部の磁束を補正部201bで減衰させ、相対的に端部の磁束密度を高めている。

【0034】(b)のものは、主要部201aに対し、補正部201bを被加熱材幅方向端部では順方向、中央部では逆方向とし、磁束の分布をより効果的に補正している。

【0035】(c)のものは、被加熱材幅方向にn個の

コイル201、～201。を直列若しくは並列(図示は直列)に接続し並設しており、中央部のコイル201、～201。に比べて端部のコイル201、～201。の巻数を増している。

【0036】〈実施形態例4〉(図9)

図9の(a)・(b)・(c)はそれぞれ電磁誘導加熱方式の加熱装置の他の構成形態例を示したものである。

【0037】(a)のものはステア(フィルムガイド)105、励磁コイル201、コア202等を有する電磁誘導加熱構造体Rの下面(ステア105の下面)と、駆動ローラー45と、従動ローラー(テンションローラー)46との、3部材間にエンドレスベルト状の導電部材としてのフィルム1を懸回張設して駆動ローラー45によりフィルム1を回転駆動する構成のものである。3はフィルム1を挟んでステア下面に圧接させた加圧ローラーであり、フィルム1の回転移動に伴い従動回転する。

【0038】(b)のものは、電磁誘導加熱構造体Rのステア下面と駆動ローラー45の2部材間にエンドレスベルト状の導電部材としてのフィルム1を懸回張設して駆動ローラー45により回転駆動する構成のものである。

【0039】(c)のものは、導電部材としてのフィルム1として、エンドレスベルト状のものではなく、ロール巻きにした長尺の有端フィルムを用い、これを繰り出し軸48側から電磁誘導加熱構造体Rのステア下面を経由させて巻き取り軸49側へ所定の速度で走行させるように構成したものである。

【0040】〈実施形態例5〉(図10)

本実施形態は例えば前述実施形態1の電磁誘導加熱方式の加熱装置を画像加熱定着装置(加熱装置)10として用いた画像形成装置の一例の概略構成図である。本実施形態の画像形成装置は、電子写真プロセス利用のレーザービームプリンターである。

【0041】11は像担持体(第1の像担持体)としての回転ドラム型の電子写真感光体(以下、感光ドラムと記す)である。該感光ドラム11は矢印の反時計方向に所定の周速度(プロセススピード)をもって回転駆動され、その回転過程で一次帯電器12によりマイナスの所定の暗電位V0に一樣に帯電処理される。

【0042】13はレーザービームスキャナであり、不図示の画像読取装置・ワードプロセッサ・コンピュータ等のホスト装置から入力される目的画像情報の時系列電気デジタル画素信号に対応して変調されたレーザービームLを出力し、前記のように一次帯電器12でマイナスに一樣帯電された感光ドラム11面が該レーザービームで走査露光されることで露光部分の電位絶対値が小さくなって明電位VLとなり回転露光ドラム11面に目的の画像情報に対応した静電潜像が形成されていく。

【0043】次いでその潜像は現像器14によりマイナ

スに帯電した粉体トナーで反転現像（レーザー露光部V<sub>L</sub>にトナーが付着）されて顕像化される。

【0044】現像器14は回転駆動される現像スリーブ1402と現像ブレード1401とを有しており、該現像ブレード1401としては通常金属製若しくは樹脂製のものが用いられ、樹脂系のものは現像スリーブ1402に対して適正な当接圧をもって接している。そして現像スリーブ1402と現像ブレード1401とによって、トナー高さ、トリボを制御され、現像スリーブ上1402にマイナスの電荷をもった均一なトナー層が形成されて感光ドラム11面と対向し、スリーブ1402にはその絶対値が感光ドラム11の暗電位V<sub>D</sub>よりも小さく、明電位V<sub>L</sub>よりも大きな現像バイアス電圧V<sub>DC</sub>が印加されていることで、スリーブ1402上のトナーが感光ドラム11の明電位V<sub>L</sub>の部分にのみ転移して潜像が顕像化（反転現像）される。

【0045】一方、給紙トレー25上に積載セットされている被記録材（第2の像担持体、転写紙）Pが給紙ローラー26により1枚宛繰り出し給送され、搬送ガイド27、レジストローラー28、転写前ガイド29を経由して、感光ドラム11と転写装置15との対向位置（転写部）へ、感光ドラム11の回転と同期どりされた適切タイミングをもって給送され、転写バイアスが印加された転写装置15によって該転写部を通過する被記録材P面に感光ドラム11面側のトナー像が順次に転写されていく。

【0046】該転写部を通った被記録材Pは感光ドラム11面から分離され、搬送ガイド34で定着装置10へ導入されて転写トナー像の定着を受け、画像形成物（プリント）として排紙トレイ36へ出力される。被記録材分離後の感光ドラム11面はクリーニング装置33で転写残りトナー等の感光ドラム面残留物の除去を受けて清浄面化されて繰り返して作像に供される。

【0047】〈その他〉尚、以上の各形態例では加熱部材として、フィルムに発熱層を具備した例を示したが、フィルム自体を加熱体で構成したもの（金属スリーブ等）や、金属ローラに交番磁束を作用させるようにしたローラ方式のものでも良い。

【0048】また、固定支持された導電性（望ましくは強磁性）の平板を用い、該平板に直接或はフィルムを介して加圧部材を圧接してニップを形成し、該平板に交番磁束を作用させて発熱させ、該ニップを通過させる被加熱材の加熱処理を行う構成であっても良い。

【0049】

【発明の効果】以上説明したように、本出願に係る発明

によれば、励磁コイルが発生させる端部磁界を補正し、加熱部の被加熱材幅方向に関する発熱量の分布を均一にすることが可能な加熱装置及び該加熱装置を備えた画像形成装置の提供を達成することができる。

【0050】また、該画像形成装置において定着不良や光沢ムラやオフセットの無い高いパフォーマンスを達成することができる。

【図面の簡単な説明】

【図1】 実施形態1の加熱装置の概略構成を示す模式図

【図2】 単一巻励磁コイルにおける磁界発生分布及びニップの温度分布の説明図

【図3】 端部補正巻励磁コイルにおける磁界発生分布及びニップの温度分布の説明図

【図4】 励磁コイル端部の説明図

【図5】 励磁コイルの他の構成を示す該励磁コイルとコアの模式断面図

【図6】 実施形態2の磁界発生手段の端部構成を示す模式図

【図7】 実施形態2の磁界発生手段の端部構成を示す模式図

【図8】 励磁コイルの他の形態の概略構成図

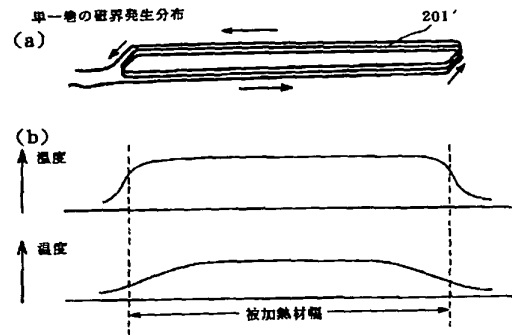
【図9】 加熱装置の他の形態の概略構成図

【図10】 画像形成装置の概略構成図

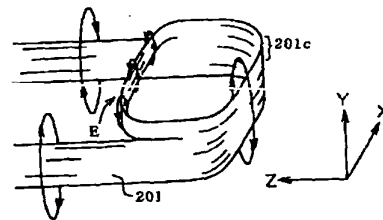
【符号の説明】

- 1 定着フィルム
- 101 発熱層
- 102 弾性層
- 103 離型層
- 105 フィルムガイド
- 201 励磁コイル
- 202 コア
- 203 補正用コア
- 3 加圧ローラ
- 301 芯金
- 302 シリコーンゴム
- 10 定着装置
- 11 感光ドラム
- 12 一次帯電器
- 13 スキャナー
- 14 現像器
- 1401 現像ブレード
- 1402 現像スリーブ
- 15 転写装置

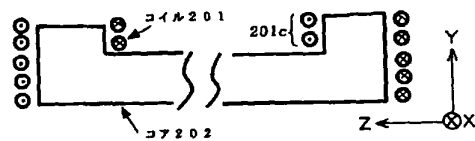
【圖2】



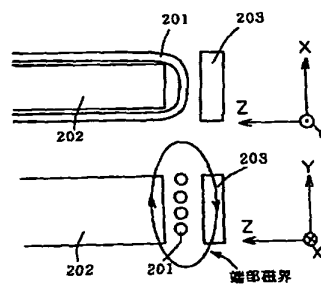
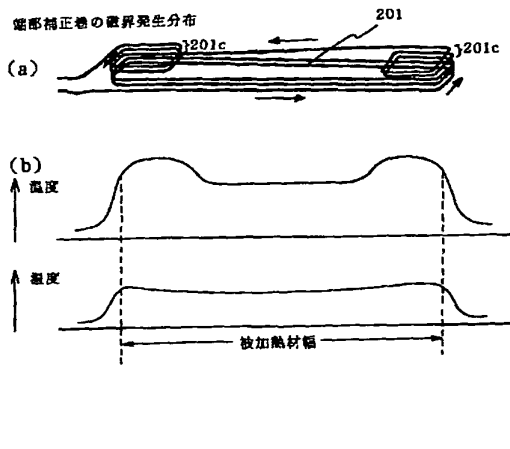
【圖4】



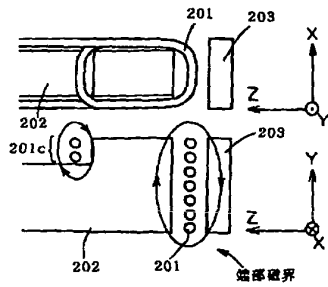
【圖5】



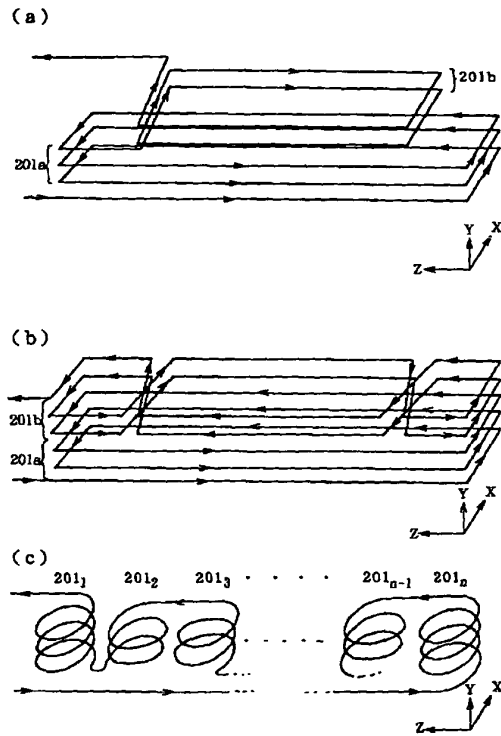
【図6】



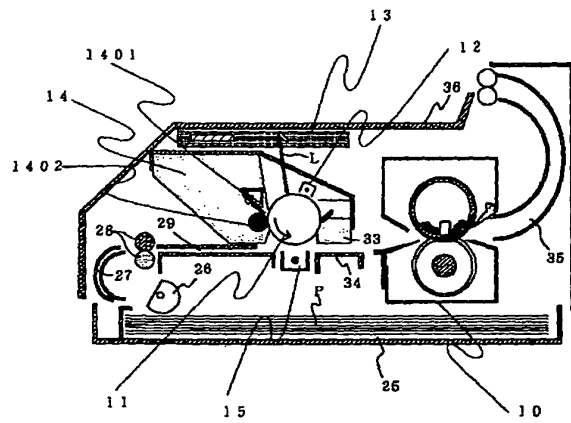
【図7】



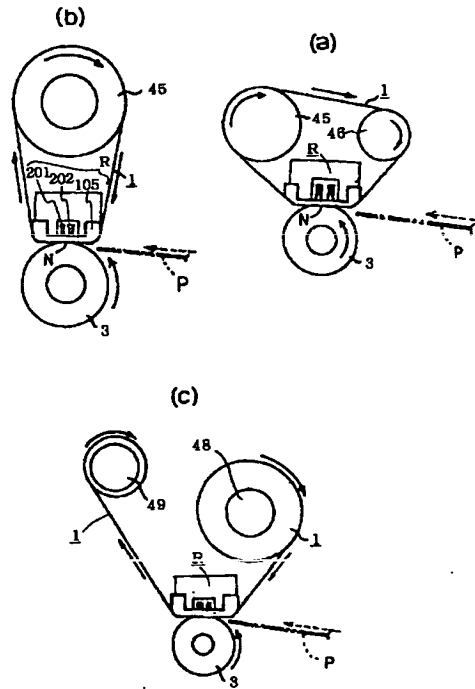
【図8】



【図10】



【図9】




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フロントページの続き

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**HEATER AND IMAGE FORMING DEVICE**

Patent Number: JP10064670  
Publication date: 1998-03-06  
Inventor(s): KANEDA KEISUKE;; HAYASHIZAKI MINORU;; NAKANE KIYOBUMI;; NANATAKI HIDEO  
Applicant(s): CANON INC  
Requested Patent: ☐ JP10064670  
Application Number: JP19960238602 19960821  
Priority Number(s):  
IPC Classification: H05B6/14  
EC Classification:  
Equivalents:

**Abstract**

**PROBLEM TO BE SOLVED:** To provide a heater capable of heating with uniform temperature distribution so as to prevent inferior fixing, uneven glossiness, and offset when the heater is applied to an image forming device by correcting an end part magnetic field generated by an exciting coil.  
**SOLUTION:** A fixing film represented by 1 is composed of a heating layer 101, an elastic layer 102, and a mold release layer 103. An exciting coil is represented by 201, and a ferrite core by 202 a pressing roller is represented by 3 that forms a nip N through pressure contact with a lower face of a film guide 105 via the fixing film 1. An alternating magnet flux generated by the exciting coil 201 is led to the ferrite core 202, an eddy current is generated in the heating layer 101 of the fixing film, and a recording material P that is a heated material to be carried to the nip N by the heat generated by the eddy current and a toner T on the recording material P is heated. The energizing coil 201 is improved in that the number of turns at an end part 201c is greater than that at the center in the widthwise direction of the heated material P.

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(71)Applicant : CANON INC

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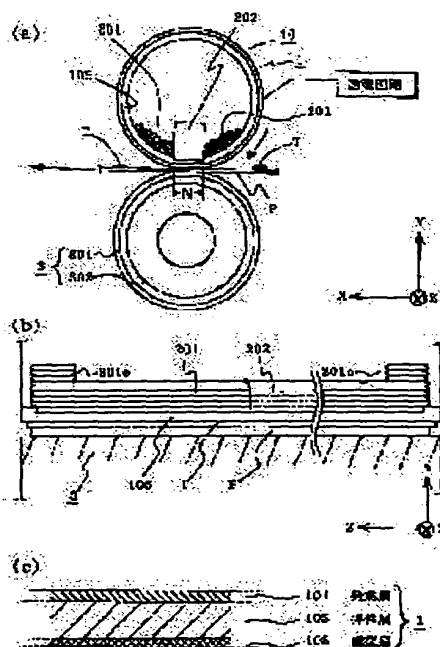
(72)Inventor : KANEDA KEISUKE  
HAYASHIZAKI MINORU  
NAKANE KIYOBUMI  
NANATAKI HIDEO

## 54) HEATER AND IMAGE FORMING DEVICE

### 57)Abstract:

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## LEGAL STATUS

Date of request for examination]

Date of sending the examiner's decision of rejection]

Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

Date of final disposal for application]

Patent number]

Date of registration]

Number of appeal against examiner's decision of rejection]

Date of requesting appeal against examiner's decision of rejection]

Date of extinction of right]

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\*\*\*\* shows the word which can not be translated.

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LAIMS

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Claim(s)]

Claim 1] The heating component which fixes or moves, and a magnetic field generating means to generate alternating field and to make this heating component generate heat by operation of this magnetic field, When it is the heating apparatus which it has the pressurization member which is made to carry out a pressure welding to this heating component, and forms a nip, and heated material is conveyed to this nip, it is passed, and heats this heating material and the heated material conveyance direction and the direction which intersects perpendicularly are made into the heated material cross direction, Heating apparatus characterized by having changed the density of the magnetic flux generated by the aforementioned magnetic field generating means in the heated material cross direction of a heating component, and making uniform the temperature distribution of the heated material cross direction of a nip.

Claim 2] The heating component which fixes or moves, and a magnetic field generating means to generate alternating field and to make this heating component generate heat by operation of this magnetic field, When it is the heating apparatus which it has the pressurization member which is made to carry out a pressure welding to this heating component, and forms a nip, and heated material is conveyed to this nip, it is passed, and heats this heating material and the heated material conveyance direction and the direction which intersects perpendicularly are made into the heated material cross direction, The aforementioned magnetic field generating means is heating apparatus characterized by making flux density in a heating component edge higher than the heating component center section of the heated material cross direction.

Claim 3] The aforementioned magnetic field generating means is the claim 1 or the heating apparatus of 2 characterized by making [ more ] the number of turns of an edge in the heated material cross direction of the exiting coil which generates a magnetic field than a center section.

Claim 4] The aforementioned magnetic field generating means is heating apparatus given in any of the claim 1 characterized by having arranged the core for amendment near the edge in the heated material cross direction of the exiting coil which generates a magnetic field, and centralizing magnetic flux, or a claim 3 they are.

Claim 5] Heating apparatus given in any of the claim 1 characterized by heat-treating the \*\*\*\* agent picture made to support on record material, or a claim 4 they are.

Claim 6] Image formation equipment characterized by having an image formation means to make a \*\*\*\* agent picture support on record material, and heating apparatus given in any of the claim 1 as image heating apparatus which heat-treats this \*\*\*\* agent picture, or a claim 4 they are.

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[translation done.]

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 DETAILED DESCRIPTION
 

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## Detailed Description of the Invention]

[001]

The technical field to which invention belongs] this invention uses electromagnetic induction and relates to image formation equipment equipped with the heating apparatus and it which carry out making a heating unit generate an eddy current loss etc., and are heated. Especially this heating apparatus is suitable for the equipment which carries out heating fixing processing of the toner picture which is not established [ which was formed in the field of record material by direct or the indirect method using the toner which consists of a resin of heating melting nature etc. ] as a permanent fixing picture in a record material side by proper image-formation process meanses, such as the fixing equipment in image formation equipments, such as an electrophotography copying machine and printer facsimile, i.e., electrophotography, electrostatic recording, magnetic recording, etc.

[002]

Description of the Prior Art] As heating apparatus represented by heating fixing equipment, a heat mechanical control roller and the so-called contact heating methods, such as a film heating method, are widely used from the former.

[003] Also in it, the toner image is heated through rodding of the fixing roller which has high heat capacity, the rubber elastic layer for wrapping in a toner image and fusing uniformly, etc. with the fixing equipment of the image formation equipment which performs full color image formation of which the capacity to which heating melting of a maximum of four-layer toner layer is carried out enough is required.

[004] In such equipment, since interstitial segment material, such as rodding and rubber elastic layer, was prepared, when good fixing nature was secured, it was in the inclination which a heat source and heated material leave, and efficient-izing was difficult.

[005] On the other hand, in JP,5-9027,B, the heating apparatus of the electromagnetic heating method which a fixing roller is made to generate an eddy current by magnetic flux, and is made to generate heat by the Joule's heat is indicated, near of the exoergic position could be carried out to the toner image by using generating of an eddy current, and the fixing process more efficient than the heat roller using the halogen lamp is attained.

[006]

Problem(s) to be Solved by the Invention] However, in the heating apparatus of the above-mentioned electromagnetic heating method, thermolysis of a heating unit edge, when the generating states of magnetic flux differed in an edge and a center section, the bird clapper had heating to heated material unevenly. For this reason, problems, such as poor fixing, gloss nonuniformity, and offset, had occurred with image formation equipment equipped with this heating apparatus.

[007] Then, the purpose of this invention should maintain uniform temperature distribution in the heated material cross direction of a heating unit in heating apparatus. Moreover, it is in attaining the high performance which has neither poor fixing, uneven brightness nor offset also in image formation equipment equipped with this heating apparatus.

[008]

Means for Solving the Problem] this invention is the heating apparatus and image formation equipment which are characterized by the following composition.

[009] (1) The heating component which fixes or moves, and a magnetic field generating means to generate alternating field and to make this heating component generate heat by operation of this magnetic field, When it is the heating apparatus which it has the pressurization member which is made to carry out a pressure welding to this heating component, and forms a nip, and heated material is conveyed to this nip, it is passed, and heats this heating material and the heated material conveyance direction and the direction which intersects perpendicularly are made into the heated material cross direction, Heating apparatus characterized by having changed the density of the magnetic flux

generated by the aforementioned magnetic field generating means in the heated material cross direction of a heating component, and making uniform the temperature distribution of the heated material cross direction of a nip.

010] (2) The heating component which fixes or moves, and a magnetic field generating means to generate alternating field and to make this heating component generate heat by operation of this magnetic field, When it is the heating apparatus which it has the pressurization member which is made to carry out a pressure welding to this heating component, and forms a nip, and heated material is conveyed to this nip, it is passed, and heats this heating material and the heated material conveyance direction and the direction which intersects perpendicularly are made into the heated material cross direction, The aforementioned magnetic field generating means is heating apparatus characterized by making flux density in a heating component edge higher than the heating component center section of the heated material cross direction.

011] (3) The aforementioned magnetic field generating means is heating apparatus of (1) or (2) characterized by making [ more ] the number of turns of an edge in the heated material cross direction of the exiting coil which generates a magnetic field than a center section.

012] (4) The aforementioned magnetic field generating means is heating apparatus given in any of (1) or (3) which is characterized by having arranged the core for amendment near the edge in the heated material cross direction of the exiting coil which generates a magnetic field, and centralizing magnetic flux they are.

013] (5) Heating apparatus given in any of (1) or (4) which are characterized by heat-treating the \*\*\*\* agent picture made to support on record material they are.

014] (6) Image formation equipment characterized by having an image formation means to make a \*\*\*\* agent picture support on record material, and heating apparatus given in (1) as image heating apparatus or any of (4) they are. which heat-treats this \*\*\*\* agent picture ]

015] That is, in the both ends of the above-mentioned coil, generating more magnetic flux compared with the increase of number of turns, and a center section, by leading to a heating unit, without arranging the core for amendment near the both ends of the above-mentioned coil, and dispersing magnetic flux at this edge in addition to a heating unit, etc., the distribution of magnetic flux which makes it generate with a magnetic field generating means can be set up appropriately, and the temperature distribution of the cross direction of a heating component can be made uniform.

016]

Embodiments of the Invention]

Example 1 of an operation form> The longitudinal-section model view and drawing 1 (c) of the cross-section model view (1) whole heating-apparatus showing [ 1 ] the outline composition of the fixing equipment of this invention (a) and drawing 1 (b) are the \*\* type cross sections of a fixing film. It is the insulating film guide to which 1 does not bar a fixing film and 105 does not bar passage of magnetic flux in this drawing, and the fixing film 1 rotates in the direction of an arrow, while conveyance stability is planned by the film guide 105. The exiting coil for 201 generating alternate magnetic flux and 202 are the ferrite cores for raising efficiently the alternate magnetic flux generated by the exiting coil 201 around a nip, and are supported by the film guide 105.

0017] The excitation circuit is connected to the exiting coil 201, and this excitation circuit can supply now 50kHz police box current to an exiting coil 201. 3 makes the silicone rubber layer 302 cover with a pressurization roller 2mm in rodding 301, gives elasticity, and through the fixing film 1, the pressure welding of it is carried out to the undersurface of the film guide 105, and it forms Nip N in it. Moreover, as for the pressurization roller 3, the role of the drive roller which carries out a rotation drive also serves as the fixing film 1 in the conveyance direction (X shaft orientations in drawing) of the record material P as heated material.

0018] It \*\*, and this alternate magnetic flux is led to a ferrite core 202, and makes the exoergic layer 101 of the fixing film 1 for the above-mentioned heating apparatus to supply police box current to a coil 201 from an excitation circuit, to generate alternate magnetic flux, and generate an eddy current. This eddy current generates the Joule's heat with the specific resistance of the exoergic layer 101, and heat-treats the toner T on the record material P conveyed by Nip N through the elastic layer 102 and the mold release layer 103, and the record material P.

0019] (2) If the fixing film 1 fixing film 1 is explained, the fixing film 1 covers the front face of the exoergic layer 101 with a thickness of 50 micrometers it is thin from the nickel as a heating element with the elastic layer 102 which consists of silicone rubber, and has covered it with the mold release layer 103 of a fluororesin further.

0020] As an exoergic layer 101, it is 10-5 to 10-10 besides nickel. The metal which is the electric good conductor of mega-m, metallic compounds, and an organic conductor may be used, and pure metals or those compounds, such as more desirable iron with high (ferromagnetism is shown) permeability and cobalt, can be used.

0021] If thickness of this exoergic layer 101 is made thin too much, it becomes impossible to secure sufficient magnetic path, magnetic flux may leak to the exterior, and own exoergic energy of a heating element may become

all. Moreover, when it thickens, there is an inclination for heat capacity to become large and for the time which a temperature up takes to become long. Therefore, with the value of the specific heat of the material used for the heating element, density, permeability, and resistivity, the proper value had the thickness of the exoergic layer 101, and with its operation gestalt, it is the range of 10-100-micrometer thickness, and was able to obtain the programming rate 3 degrees C / more than sec.

022] In the elastic layer 102, if a degree of hardness is too high, the irregularity of record material or a toner layer will not be able to be followed, and picture gloss nonuniformity will occur. Then, as a degree of hardness of this elastic layer 102, below 45 degrees (JIS-A) are more preferably good below 60 degrees (JIS-A). Moreover, about the thermal conductivity  $\lambda$  of the elastic layer 102,  $6 \times 10^{-4}$  to  $2 \times 10^{-3}$  [cal/cm-sec-deg.] is good. Thermal conductivity  $\lambda$  of the thermal resistance is large when smaller than  $6 \times 10^{-4}$  [cal/cm-sec-deg.], and the temperature rise in the surface of the printing film 1 becomes late.

023] As a mold release layer 103, a good material of mold-releases characteristic, such as silicone resin, silicone rubber, and a fluororubber, and thermal resistance can be chosen in addition to fluororesins, such as PFA, PTFE, and FEP. If the thickness of the mold release layer 103 has desirable 20-100 micrometers and the thickness of this mold release layer 103 is smaller than 20 micrometers, the problem that the \*\* nonuniformity of a paint film arises, the bad portion of a mold-release characteristic is made, or endurance runs short at the time of manufacture will occur. Moreover, if a mold release layer exceeds 100 micrometers, the problem that heat conduction gets worse will occur, especially when it is the mold release layer of a resin system, a degree of hardness will become high too much, and the effect of the elastic layer 102 will fade.

024] (3) Exiting coil 201 ( drawing 2 )

Although alternate magnetic flux sufficient as an exiting coil 201 for heating is generated, for that, it is low in a resistance component, and it is necessary to take a high inductance component. With this operation form, it has wound 2 times so that a core 202 may be around gone using the thing of phi 1 for RFs which bundled the thin line as a core wire of an exiting coil 201, as shown in drawing 2 .

025] To having been single volume coil 202' as conventionally shown in drawing 2 (a), in this example of an operation form, as shown in drawing 3 (a), one electric wire is coiled continuously, and the number of turns of both ends are increased rather than the number of turns (12 times) of a center section. namely, loss of the weak edge of magnetic field restraint -- an amendment -- like -- the increase of the number of turns of an edge -- flux density is strengthened partially

026] The heating apparatus which made other composition the same was equipped with such conventional exiting-coil 201' and the exiting coil 201 of this example, the distribution of the longitudinal direction (heated material cross direction) of the flux density of a longitudinal direction and nip N temperature was compared, and it was shown in drawing 2 (b) and drawing 3 (b).

027] In conventional exiting-coil 201', as shown in drawing 2 (b), flux density is abbreviation regularity over a longitudinal direction, and the temperature of Nip N is low at both ends according to that the magnetic-flux flux of light force in the crosswise edge of a heating component is weak, there being many heat releases, etc.

028] On the other hand, in the exiting coil 201 of this example, by having made flux density of a longitudinal direction edge high compared with the center section, as shown in drawing 3 (b), it crossed throughout the longitudinal direction of Nip N, and uniform temperature distribution have been obtained. In the field E shown in drawing 4 at this time, although few reverse magnetic fields arise, it is the grade which can be disregarded almost uninfluential to the temperature of Nip N.

029] Furthermore, since a magnetic path is secured like drawing 5 , it can be made more effective by extending a ferrite core to the portion of amendment coil 201c.

030] <The example 2 of an operation gestalt> ( drawing 6 and drawing 7 )

Moreover, a core 202 and the ferrite core 203 of this quality of the material are arranged at the edge of an exiting coil 201 like drawing 6 as other examples of an operation gestalt, and it becomes possible to prevent emission of a magnetic field by securing a magnetic path to the magnetic flux emitted from an edge, and to carry out flux density of an edge to a part for a center section more than equivalent.

031] Moreover, the distribution of magnetic flux can be set up still more effectively by forming the core 203 for amendment with amendment coil 201c, as shown in drawing 7 .

032] <The example 3 of an operation gestalt> ( drawing 8 )

a) -(b) - (c) of drawing 8 shows other examples of a gestalt of an exiting coil 201, respectively.

033] The thing of (a) has amendment section 201b of a retrose to principal part 201a for making a heating component heat, and this principal part 201a, attenuates the magnetic flux of a center section by amendment section 201b among the magnetic flux by principal part 201a, and is raising the flux density of an edge relatively.

0334] To principal part 201a, at the heated material cross direction edge, it was made as the forward direction, it made a winding section 201b the opposite direction in the center section, and the thing of (b) has amended the distribution of magnetic flux more effectively.

0335] The thing of (c) is 2011-201n of n coils to the heated material cross direction. It is connecting and installing in a serial or parallel (illustration is in-series) side by side, and is coil 2012 -201n-1 of a center section. It compares and they are the coil 2011 of an edge, and 201n. Number of turns are increased.

0336] <The example 4 of an operation form> ( drawing 9 )

) -(b) - (c) of drawing 9 shows other examples of a composition form of the heating apparatus of an electromagnetic-induction heating method, respectively.

0337] The thing of (a) is a thing of composition of carrying out the \*\*\*\* set-up of the film 1 as endless-belt-like conductive member, and carrying out the rotation drive of the film 1 with the drive roller 45 in between, 3 member, of the undersurface (undersurface of stay 105) of the electromagnetic-induction heating structure R which has stay (film side) 105, an exiting coil 201, and core 202 grade, the drive roller 45, and the follower roller (tension roller) 46. 3 is the pressurization roller made [ the stay undersurface ] to carry out a pressure welding on both sides of a film 1, and carries out follower rotation with a rotation of a film 1.

0338] The thing of (b) is a thing of the stay inferior surface of tongue of the electromagnetic-induction heating structure R, and the composition of carrying out the \*\*\*\* set-up of the film 1 as endless-belt-like conductive member, and carrying out a rotation drive with the drive roller 45 in between, 2 members, of the drive roller 45.

0339] As a film 1 as conductive member, using the owner edge film of the long picture made into the endless-belt-like all volume instead of a thing, the thing of (c) lets this out, makes it go via the stay inferior surface of tongue of the electromagnetic-induction heating structure R from a shaft 48 side, is rolled round, and it is constituted so that it may be made to run at the rate of predetermined to a shaft 49 side.

0340] <The example 5 of an operation gestalt> ( drawing 10 )

this operation gestalt is the outline block diagram of an example of image formation equipment which used the heating apparatus of the electromagnetic-induction heating method of the above-mentioned operation gestalt 1 as a structure heating fixing equipment (heating apparatus) 10. The image formation equipment of this operation gestalt is the laser beam printer of electrophotography process use.

0341] 11 is an electrophotography photo conductor (it is hereafter described as a photoconductor drum) rotating-drum type [ as an image support (1st image support) ]. A rotation drive is carried out with a predetermined peripheral velocity (process speed) at the counterclockwise rotation of an arrow, and this photoconductor drum 11 is the predetermined dark potential VD of minus [ in the rotation process ] with the primary electrification vessel 12. Electrification processing is carried out uniformly.

0342] The laser beam L modulated corresponding to the time series electrical-and-electric-equipment digital pixel signal of the purpose image information which 13 is a laser-beam scanner and is inputted from host equipments, such as non-illustrated a picture reader, a word processor computer, etc., is outputted. The potential absolute value of an exposure portion becomes small by scanning exposure of the 11th page of the photoconductor drum by which uniform electrification was carried out as mentioned above with the primary electrification vessel 12 at minus being carried out by this laser beam, and it is the Ming potential VL. It becomes and the electrostatic latent image corresponding to the target image information is formed in the 11th page of a rotation exposure drum.

0343] Subsequently, with the fine-particles toner charged in minus with the development counter 14, reversal development (a toner adheres to the laser exposure section VL) is carried out, and it develops the latent image.

0344] The development counter 14 has the development sleeve 1402 and the development blade 1401 by which a rotation drive is carried out, the thing made of metal or a resin was usually used as this development blade 1401, and the thing of a resin system has touched with proper contact pressure to the development sleeve 1402. With the development sleeve 1402 and the development blade 1401, and toner height, The uniform toner layer which TORIBO was controlled and had the charge of minus in development sleeve top 1402 is formed, and it counters with the 11th page of a photoconductor drum. In a sleeve 1402, the absolute value is the dark potential VD of a photoconductor drum 11. It is small and is the Ming potential VL. By the big development bias voltage VDC being impressed The toner on a sleeve 1402 is the Ming potential VL of a photoconductor drum 11. It transfers only to a portion and develops a latent image (reversal development).

0345] It goes via 28 and the guide 29 before an imprint. on the other hand, the recorded material (the 2nd image support, transfer paper) P by which the loading set is carried out on the paper tray 25 carries out one-sheet \*\*\*\*\* feed with the feed roller 26 -- having -- the conveyance guide 27 and a resist roller pair -- The opposite position (imprint section) of a photoconductor drum 11 and imprint equipment 15 is fed with the suitable timing by which synchronising was carried out to rotation of a photoconductor drum 11. The toner image by the side of the 11th page of

photoconductor drum is imprinted one by one by the Pth page of the recorded material which passes this imprint  
tion with the imprint equipment 15 by which imprint bias was impressed.

146] It dissociates from the 11th page of a photoconductor drum, and the recorded material P which passed along  
s imprint section is introduced in the conveyance guide 34 to fixing equipment 10, and receives fixing of an imprint  
er image, and a delivery tray 36 HE output is carried out as an image formation object (print). the 11th page of the  
photoconductor drum after recorded material separation is pure in response to removal of the photoconductor drum  
e residues, such as the imprint remaining toner, with cleaning equipment 33 -- a field -- are-izing and imaging is  
resented repeatedly

147] <Others> Although each example [ still more more than ] of a gestalt showed the example possessing the  
ergic layer to the film as a heating component, what constituted the film itself from a heating object, and the thing  
the mechanical control by roller it was made to make alternate magnetic flux act on metal rollers (metal sleeve etc.)  
y be used.

148] Moreover, you may be the composition of heat-treating the heated material which the pressure welding of the  
ssurization member is carried out to this plate through direct or a film, and a nip is formed using the conductive  
sirable ferromagnetism) plate by which fixed support was carried out, and makes alternate magnetic flux acting on  
s plate, makes it generating heat, and passes this nip.

149] [Effect of the Invention] As explained above, according to invention concerning this application, the edge magnetic  
ld which an exiting coil generates can be amended, and offer of image formation equipment equipped with the  
ating apparatus which can make uniform the distribution of the calorific value about the heated material cross  
ection of a heating unit, and this heating apparatus can be attained.

150] Moreover, the high performance which has neither poor fixing, gloss nonuniformity nor offset in this image  
mation equipment can be attained.

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translation done.]



## NOTICES \*

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mages caused by the use of this translation.

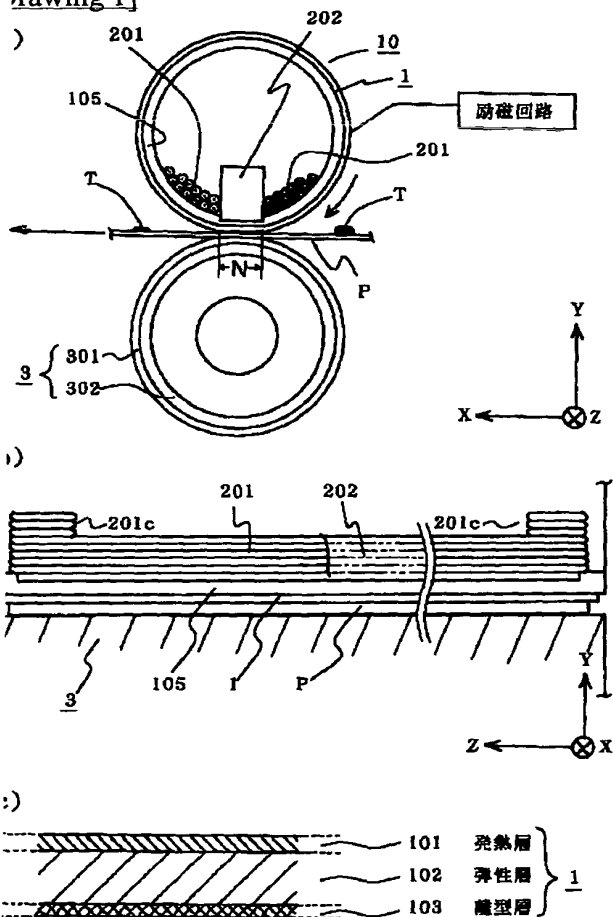
This document has been translated by computer. So the translation may not reflect the original precisely.

\*\*\*\* shows the word which can not be translated.

In the drawings, any words are not translated.

## DRAWINGS

Drawing 1]



Drawing 2]

図1 巻の磁界発生分布

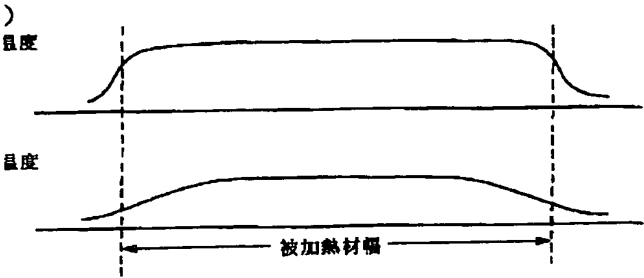
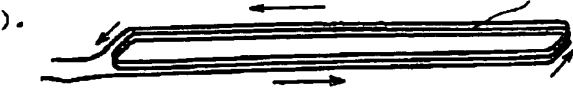


図3

部補正巻の磁界発生分布

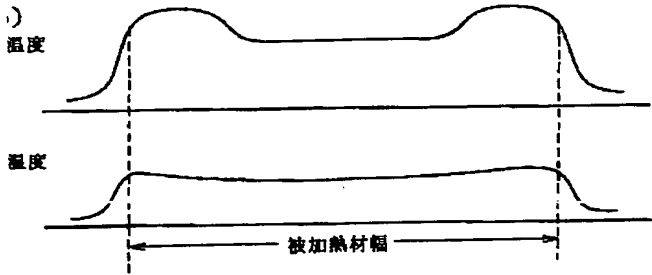
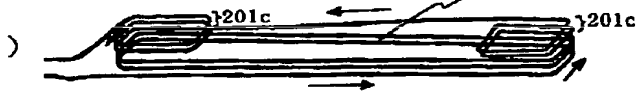


図4

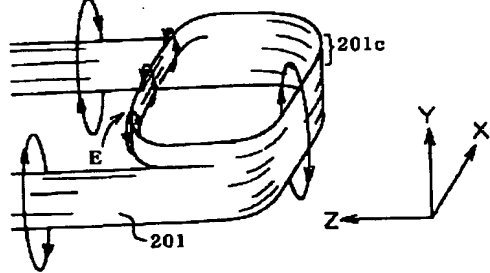


図5

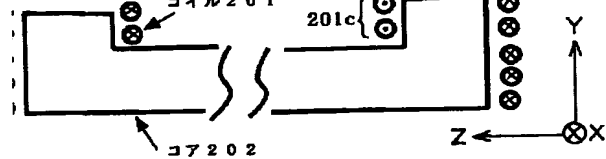


図6

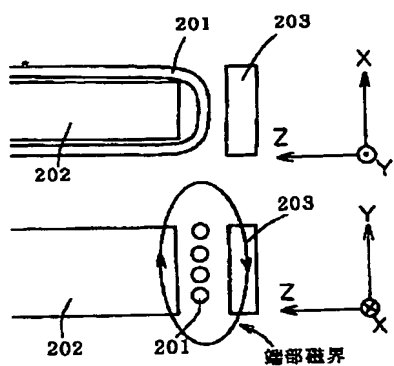


Figure 7]

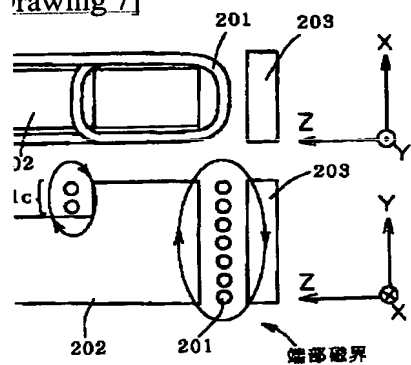
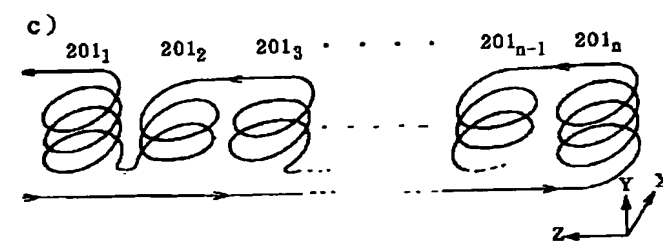
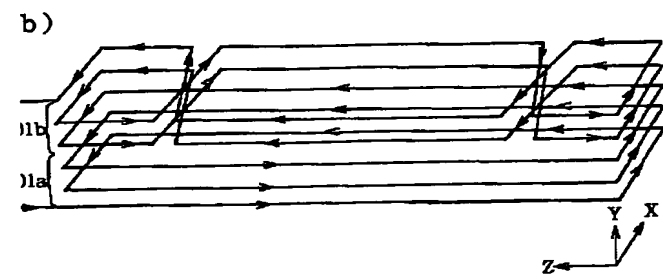
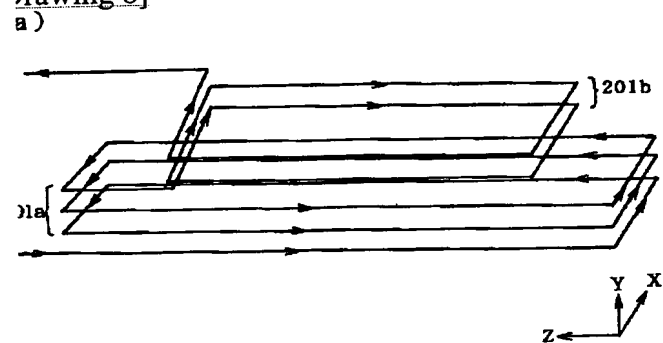
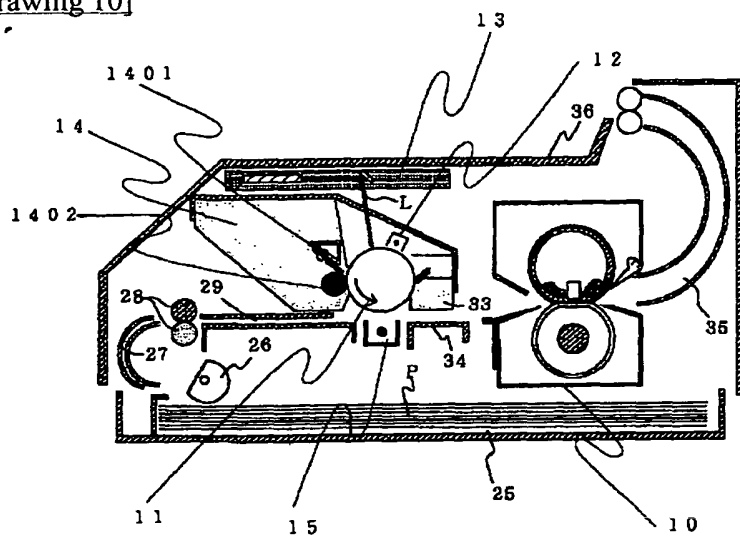


Figure 8]

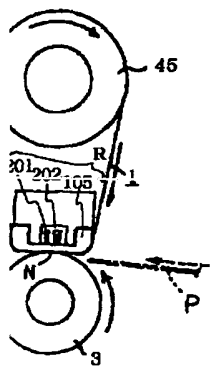


rawing 10]

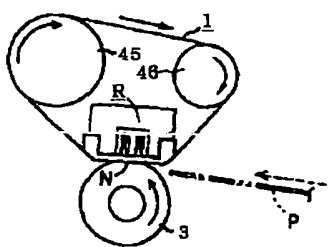


rawing 9]

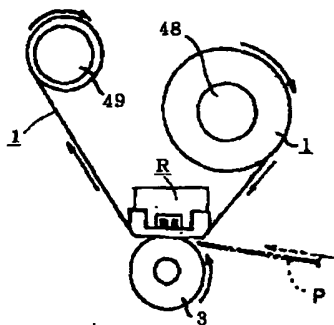
(b)



(a)



(c)



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